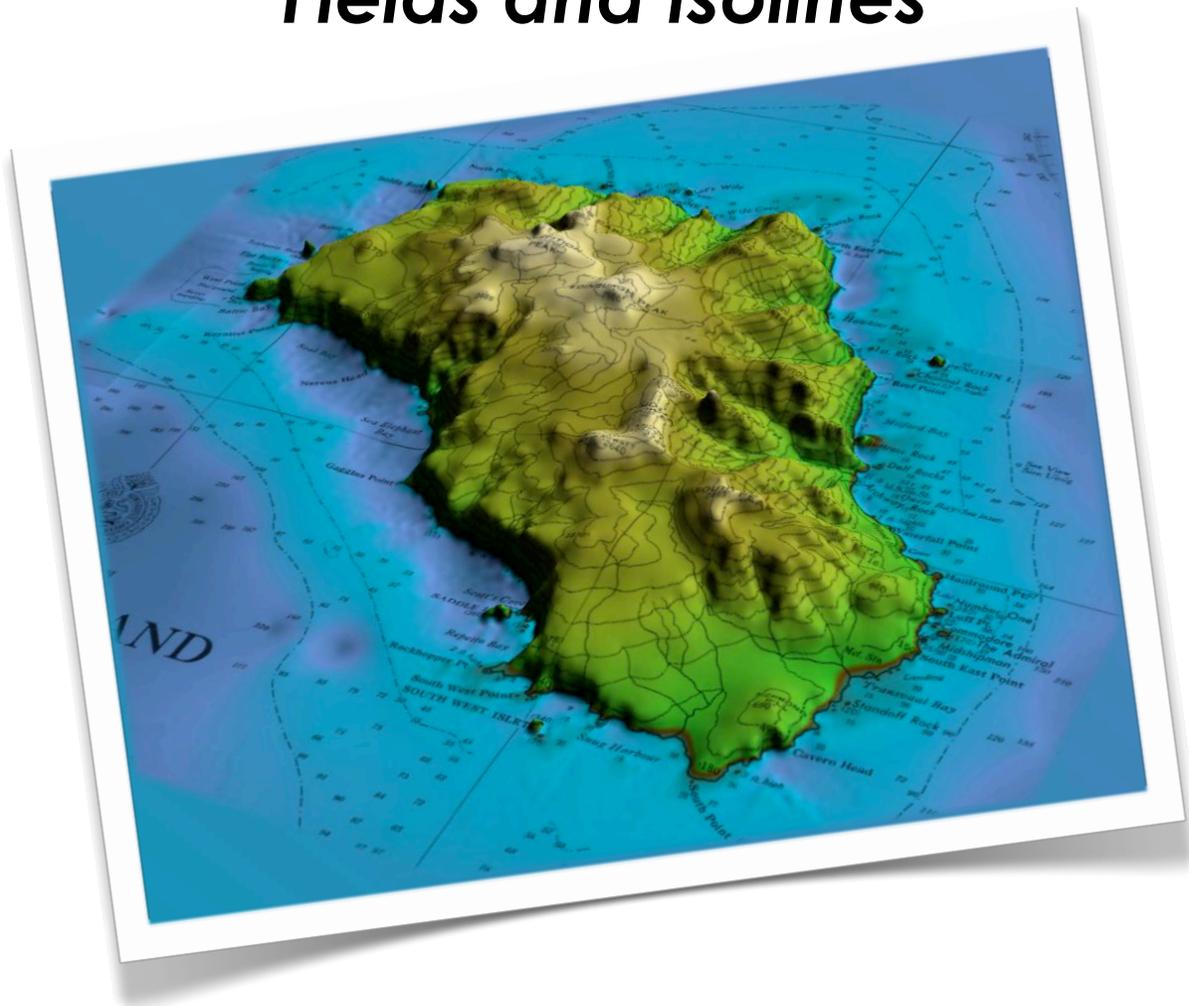


Mapping the Surface

Fields and Isolines

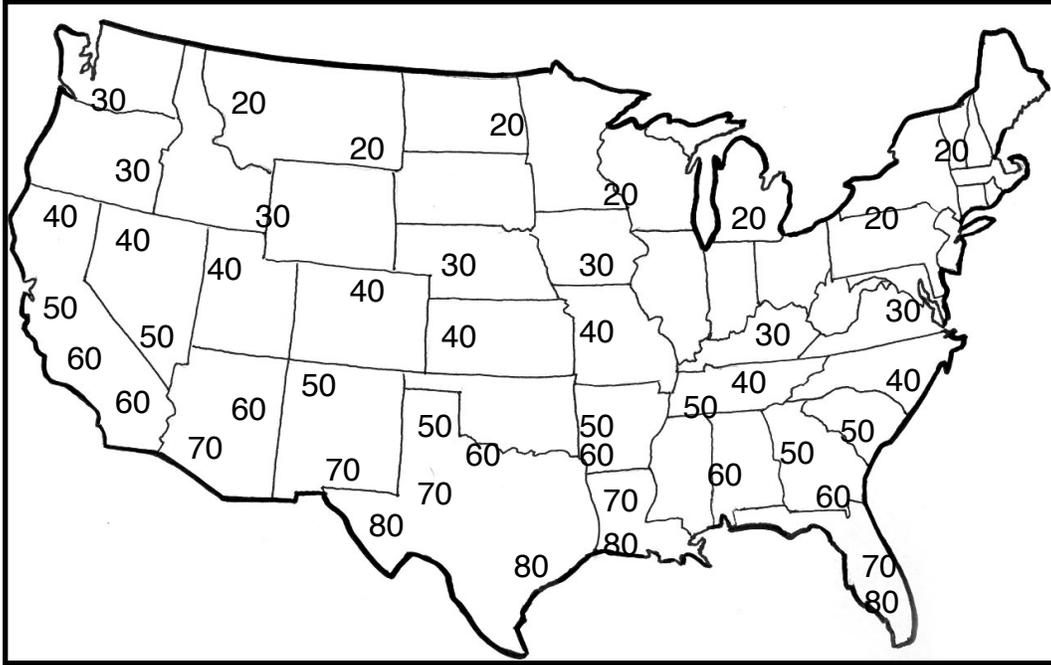


Name: _____ Period: _____

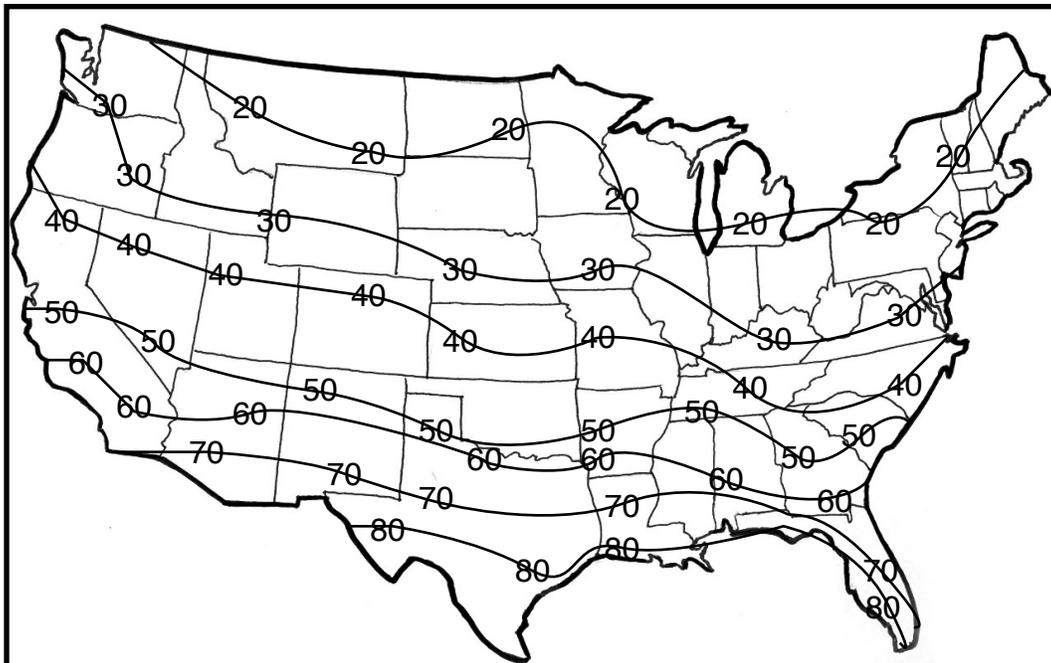
LAB #14

FIELDS

A **field** is a map that displays some sort of data. Common types of data shown on a field include temperatures, elevations, air pressures, sea surface temperatures, and even air pollution. Take a look at the field map below showing temperatures across the country.



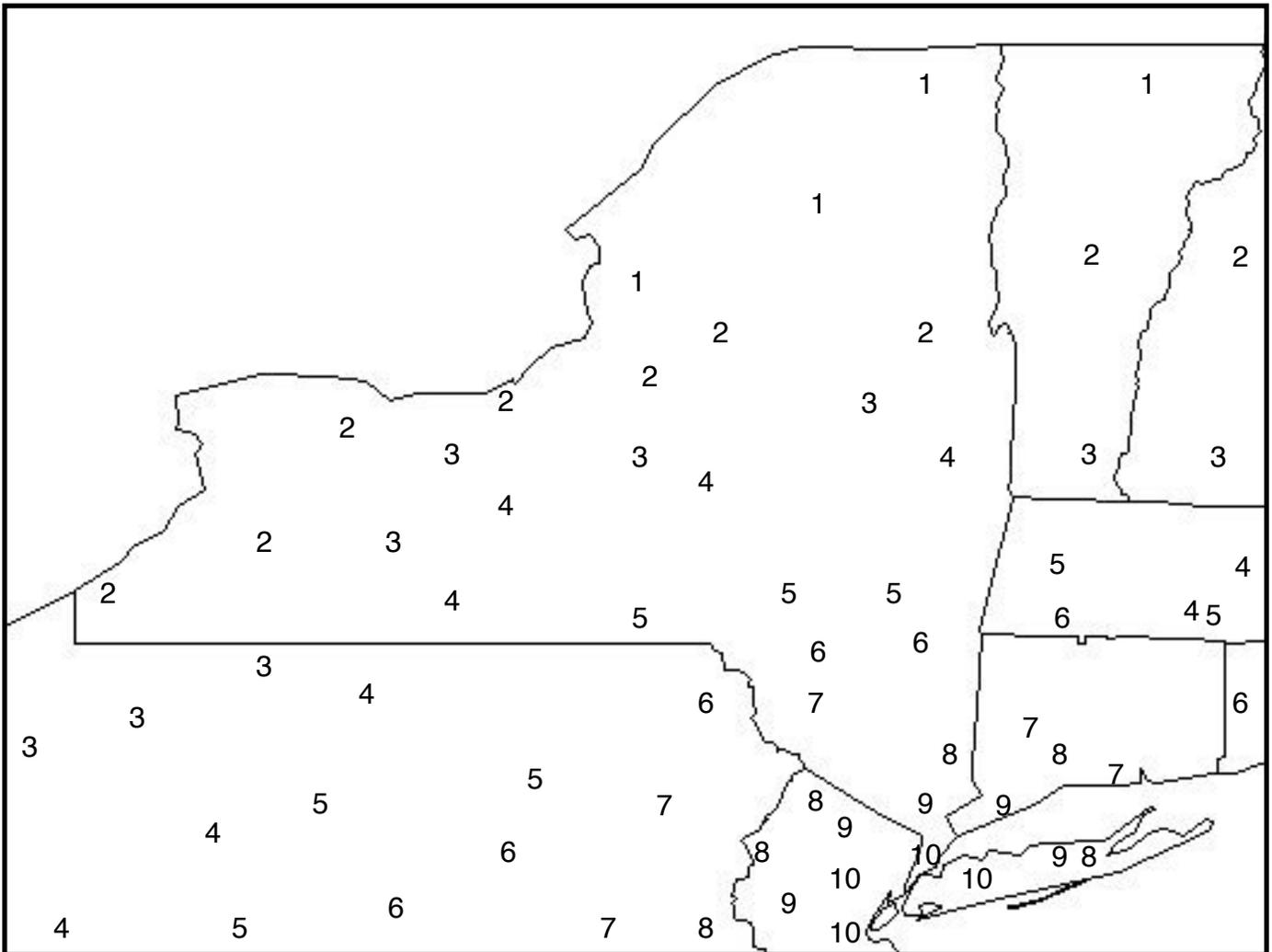
To make fields easier to interpret, we draw **isolines**. Isolines are lines that connect points of equal value. Just as there are many types of fields, there are also many types of isolines. Common isolines include the following **isotherms** (temperature), **isobars** (air pressure), and **contour lines** (elevation). Take a look at the same temperature field from above, now with the isotherms drawn in.



DRAWING ISOLINES

Drawing isolines is easy if you follow a few simple rules. Simply said, your job is to connect the dots. By dots, I mean points of equal value. For example, connect all the 30's with one line, all the 40's with another, and so forth. Always use a smooth curved line to connect the values and make sure that your isolines never cross each other. Isolines may close forming rounded shapes, or may simply run off the edge of the map, depending on the field. The **contour interval** is the change in value from one line to the next.

Try drawing isolines on the field below which shows the intensity of air pollution around New York City, NY. A value of 10 signifies a high concentration of air pollution, and a value of 1 signifies hardly any pollution at all. The contour interval is 1.



TOPOGRAPHIC MAPS

Topographic maps, also known as contour maps, are flat maps that show the shape of the land (i.e. mountains, valleys, cliffs, plains, etc.). You will be drawing several topographic maps using wooden models of different landscapes. As you proceed, fill in the information over the next several pages.

STEP #1: Key Terms

contour line-

contour interval-

index contour-

gradient-

profile-

STEP #2: Tracing the Models

You will visit and map six different topographic models. The models include: ***Simple Island, U-Shaped Valley, Mountain, River Valley, Steep Canyon Stream, Irregular Peak, and Volcanic Island***. Your first task is the use the models to draw basic topographic maps of the landscape. Complete this task by following these instructions:

1. At each station, there will be a stack of blank maps that you will use to draw the contour lines. Every student should have their own sheet.
2. Now, examine the model completely assembled. Try and visualize this landscape in nature. Take mental notes of things like how steep the slopes are and whether or not there is flowing water. Discuss your observations as a group.
3. Disassemble the model by removing each wooden "plate" from the metal pins. Be careful as the metal may be sharp.
4. Each member of your group should take one of the plates and line it up with the holes on the blank map. It should line up perfectly.
5. While holding the plate in place over the dots, trace around the plate using pencil. Be as neat as you can.
6. Label your line with the proper elevation of that plate. Determine this by looking at the bottom of the plate. If you have a plate labeled #1, the elevation is 100 feet, if you have #2, its 200 feet, #3 is 300 feet, and so forth.
7. Continue tracing plates until your map has the outline of all the plates making up that landscape.
8. Reconstruct the model and compare your new topographic map to the 3-D landscape. Discuss your observations as a group.
9. Repeat the same process for all seven models.

QUESTIONS

INSTRUCTIONS: Use the seven models around the classroom and your topographic maps to answer the following questions with your group.

1. Look at the "simple island" map and model. What details of your map indicate which side of the island is the most steep? Explain your answer. Do the other maps you drew also contain these same details?

2. Look at the "mountain" map and model. On your map, place an "A" somewhere near the top of the mountain. Now place a "B" anywhere on the map that is three inches from point "A."

- What is a possible elevation of point A? _____
- What is a possible elevation of point B? _____

On this map, each inch is equal to 10 miles.

- What is the distance between points A and B? _____

Gradient is the measure of how steep a slope is. The formula for gradient can be found on the front page of your ESRTs. Look it up and record it in the box below.

Calculate the gradient of the "mountain" between points A and B. Use the box below to show your work and solution.

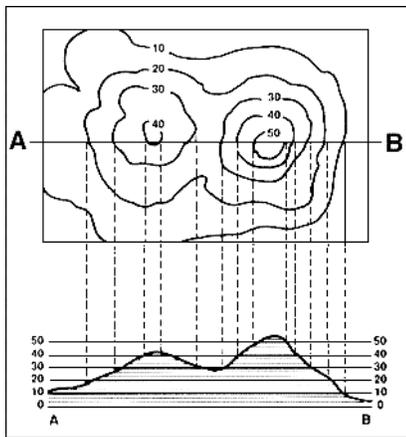
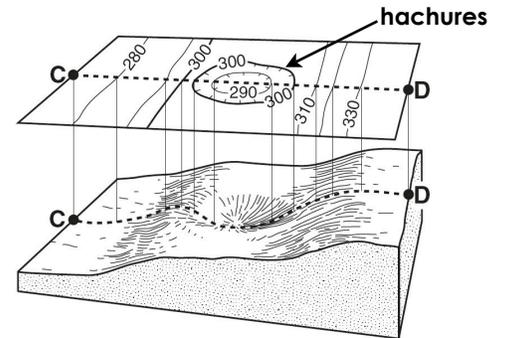
Infer what the units would be for gradient in this particular case. _____

Think of another possible unit for gradient. _____

3. Look at the "river valley" map and model. What compass direction is the river flowing? How do you know? Is there a specific characteristic of the contour lines on your map that reveals the direction the river is flowing? Explain your answer.

1. Look at the “irregular peak” map and model. What is the highest possible elevation of this landscape? Explain how you know.

2. Look at the “volcanic island” map and model. Find where there are two contour lines next to another with the same elevation value. This signifies that elevation has stopped increasing and began decreasing. This is called a **depression**. To signify that this is a depression add **hachure** lines to all contour lines of the depression (starting from the contour line that was repeated). See the example on the right for help.



3. A **profile** is a side-view, or cross-section, of a landscape along a particular line. Study and discuss the example on the left.

Look at the “steep canyon stream” map and model. With a ruler, draw a straight line from the northeast corner of your map to the southwest corner of your map. We will construct a profile along this line. Follow the instructions below to construct your profile.

Drawing a Topographic Profile

Step #1: Line up the straight edge of a piece of scrap paper along the profile line on your map.

Step #2: Make small marks on the scrap paper wherever a contour line crosses it. Label each mark with the appropriate elevation. It should look similar to the image on the right.

Step #3: Draw an X and Y axis on a piece of graph paper. Line your completed scrap paper along the horizontal axis of the graph you just drew. On the vertical axis, create a scale that will include all elevations required for this profile (from one increment below the lowest elevation to one increment above the highest).

Step #4: Above each mark on the scrap paper, plot a point for that elevation.

Step #5: Connect the dots with a smooth, curved line. It should look similar to the image on the right.

